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A New Species of *Holospira* (Gastropoda: Pulmonata) from Arizona, with the Reproductive Anatomies of *H. arizonensis* and *H. chiricahuana*

by

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Abstract. A new species, *Holospira* ***sherbrookei*** Gilbertson, is described from the Chiricahua Mountains of southeastern Arizona. It is the first *Holospira* von Martens, 1860, exhibiting a quadrilamellate shell to be described from the state and adjacent region. The reproductive anatomies of two nearby species, *H. arizonensis* Stearns, 1890, and *H. chiricahuana* Pilsbry, 1905, are also illustrated and compared.

INTRODUCTION

The Chiricahua and adjoining Dos Cabezas Mountains of southeastern Arizona form a northern extension of the Mexican Sierra Madre Occidental. They are inhabited by three known species of land snails in the genus *Holospira*: *H. arizonensis* Stearns, 1890, *H. chiricahuana* Pilsbry, 1905, and *H. cionella* Pilsbry, 1905 (Pilsbry, 1946:142–151). These, and all other species of *Holospira* from Arizona, New Mexico, and the Guadalupe Mountains of northwestern Texas, appear to form a monophyletic group. They are known on the basis of their shells alone, which are characterized by being short-whorled and unusually variable in regard to several shell features, including the number of internal lamellae (one to three). J. C. Bequaert (Bequaert & Miller, 1973:43, 138) adopted the subgeneric name *Eudistemma* Dall, 1895, for these species, thus removing them from subgenus *Bostricocentrum* Strebel, 1880 (see Pilsbry, 1946:122–123).

This paper describes a fourth species of *Holospira* from the Chiricahua Mountains. Its shell is similar externally to the shells of other species in the subgenus *Eudistemma*. However, its quadrilamellate interior is diagnostically unlike that of all other described species from this southwestern region of the United States.

SYSTEMATICS

Family Urocoptidae

Subfamily Holospirinae

Genus *Holospira* von Martens, 1860

Subgenus *Holospira s.s.* von Martens, 1860

Holospira ***sherbrookei*** Gilbertson, sp. nov.

(Figures 1, 2)

Diagnosis: A medium-sized *Holospira* with a cylindric-turriform, quadrilamellate shell. Its reproductive system is characterized by a long, slender epiphallus that inserts laterally into the penis, and by the presence of a diverticulum on the spermathecal duct.

External morphology: Animal light silvery gray in color and rather transparent. Mantle collar often embedded with many small, elongated, green bodies and numerous smaller white spots. Foot slender, ca. 7.0 mm in length, by ca. 1.0 mm in width.

Description of shell of holotype: Shell medium-sized for genus, cylindric-turret in shape, imperforate, subtrans-

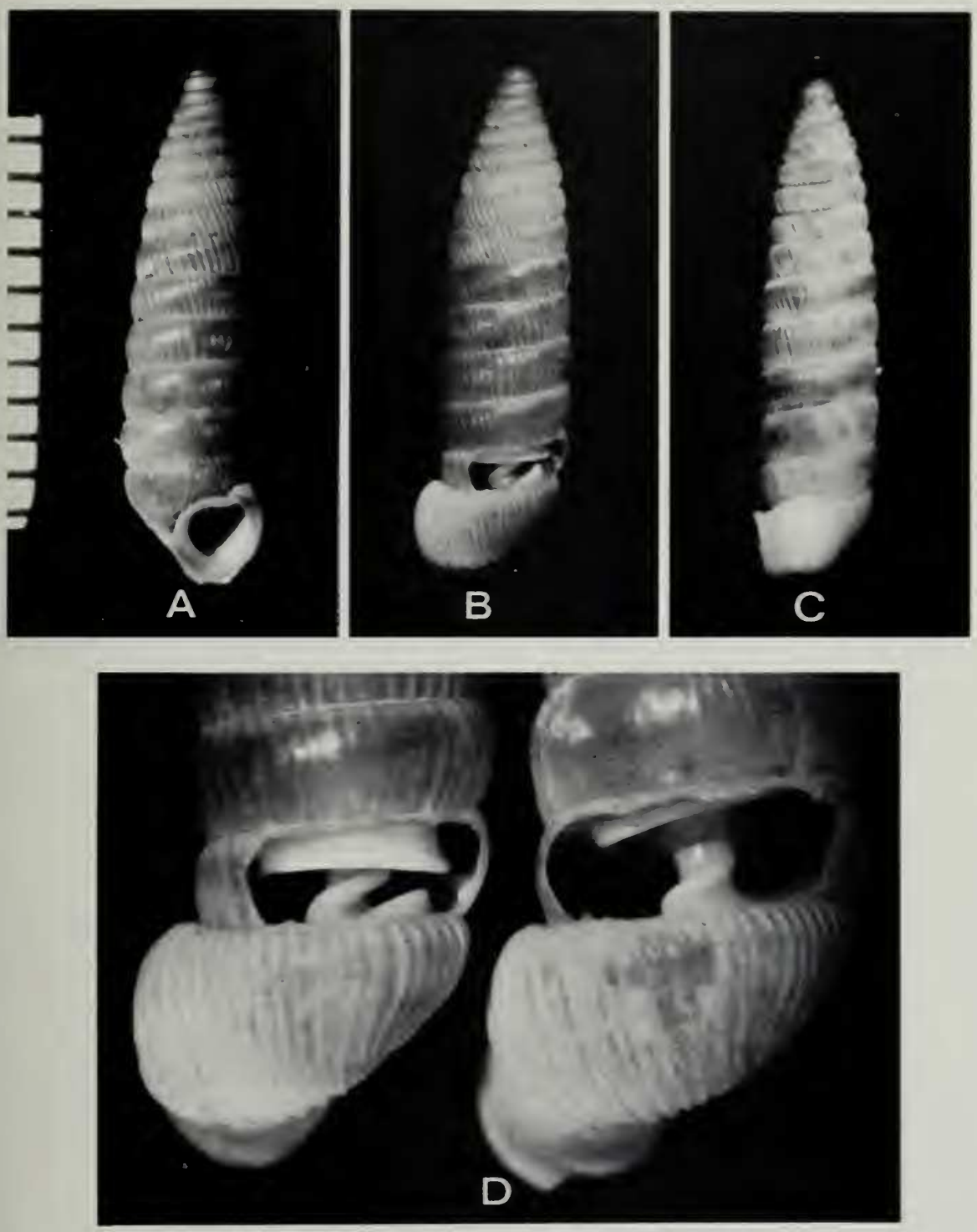

Figure 1

A and B. *Holospira* ***sherbrookei***, sp. nov., holotype, Santa Barbara Museum of Natural History No. 35043, apertural view (A) and dorsal view (B). C. Side view of paratype. D. Enlargement to show internal lamellae of *H.* ***sherbrookei*** holotype (left) and *H. a. arizonensis* (right). Scale in mm.

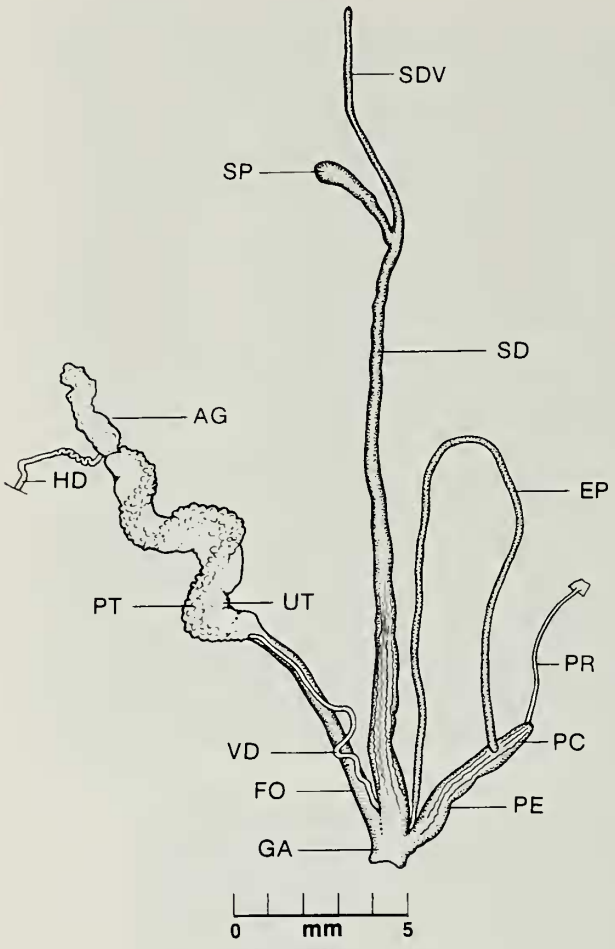

Figure 2

Reproductive system of *Holospira* ***sherbrookei***, sp. nov. Specimen collected at type locality, 16 April 1987. L. H. Gilbertson slide No. 11. Abbreviations: AG, albumen gland; EP, epiphallus; FO, free oviduct; GA, genital atrium; HD, hermaphroditic duct; PC, penial caecum; PE, penis; PR, penial retractor muscle; PT, prostate gland; SD, spermathecal duct; SDV, spermathecal diverticulum; SP, spermatheca; UT, uterus; VD, vas deferens.

parent, composed of 15.0 whorls (Figures 1A, B). Embryonic whorls 2.5 in number, rounded, smooth, tapering toward apex. Apical postembryonic shell, consisting of 7 gradually enlarging convex whorls, tannish in color, sculptured with distinct, oblique, axial ribs separated by intercostal spaces about twice as wide as ribs. Cylindric portion of shell medium brown in color, glossy, with axial ribs becoming vertical and subobsolete. Last half of body whorl opaque white, strongly costate in the region of a thick callus, slanting basally from callus to peristome, compressed laterally, and extending laterally from penultimate whorl. Internal column slender, hollow. Aperture ovate-auriculate; peristome simple and barely extended from body whorl. Armature of four strong lamellae in penultimate whorl (Figure 1D, left). Axial and parietal (superior) lamellae particularly well developed, extending entire length of whorl; basal shorter, extending one-third length of whorl; palatal rather weak but clear, appearing as a white line on side of whorl when viewed externally. Greatest development of lamellae occurring one-third distance from proximal end of penultimate whorl. Shell 14.0 mm in length, 3.8 mm in width.

Table 1

Measurements (mm) of reproductive anatomies figured in this paper.

	Holospira sherbrookei	*Holospira a. arizonensis*	*Holospira c. chiricahuana*
Penis (including caecum)	4.8	2.8	4.7
Epiphallus	20.8	16.3	15.0
Penial retractor	4.2	2.5	2.2
Spermathecal duct	16.8	14.8	10.5
Spermathecal diverticulum	7.0	12.0	5.3
Spermatheca (to junction)	3.2	4.0	2.5
Free oviduct	6.1	3.8	4.0
Uterus	8.5	8.8	6.8

Shell variation: Twelve representative paratypes range from 13.0 to 13.9 mm (mean 13.4 mm) in length, 3.5 to 3.9 mm (mean 3.6 mm) in width, and have 14.0 to 15.2 (mean 14.7) whorls. Several specimens are a more uniform, brown color (except body whorl) compared to holotype. Some exhibit well-developed axial ribs on cylindric portion of shell. Penultimate whorl of 30 remaining shells has been opened to expose lamellae: 27 quadrilamellate, 2 trilamellate (lacking palatal), and 1 unilamellate (reduced axial only).

Description of reproductive anatomy: Reproductive anatomy (Figure 2) generally similar to other described urocoptid anatomies. Penis of moderate size, containing several internal folds, continuing apically as a caecum (see Thompson, 1976). Epiphallus very long and slender, inserting laterally into penis; first third glandular, middle third slightly so. Penial retractor muscle slender, attaching near apex of penial caecum. Spermathecal duct long, rather wide, bearing a diverticulum; basal portion containing several longitudinal internal folds. Spermatheca elongate. Vagina and accessory glands lacking. Free oviduct of average length with slightly convoluted vas deferens alongside it. Retractor muscle (not shown) inserting on basal portions of oviduct and spermathecal duct. Uterus of typical size and shape with attached prostate gland rising from surface. Albumen gland small, elongate. Length measurements of distinctive structures given in Table 1.

Description of radula: Radula typical for genus; formula (14–15)·6·1·6·(14–15). Central and lateral teeth consisting of conic mesocone; first marginal tooth developing a short ectocone which enlarges on ensuing marginals.

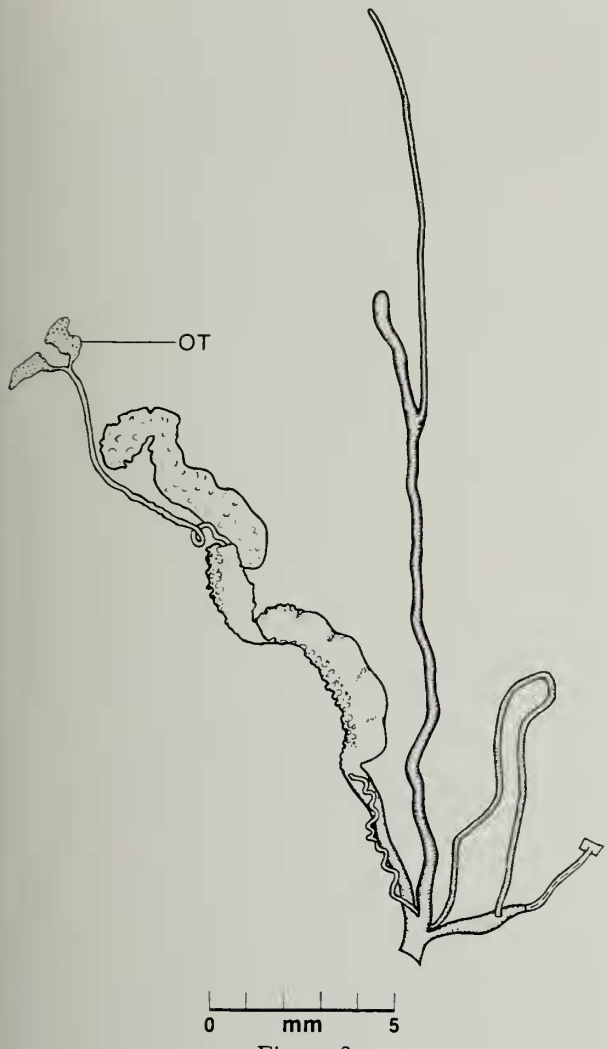

Figure 3

Reproductive anatomy of *Holospira a. arizonensis*. Specimen collected at the Cave at Dos Cabezas, Cochise Co., Arizona (type locality), by W. B. Miller, 30 March 1971. W. B. Miller slide No. 5359. OT, ovotestis.

Mesocone becoming variably bifurcate on marginals ca. 3–11.

Type locality: The type locality is in Silver Creek Canyon of the Chiricahua Mountains, near an unnamed mine, 3.4 road miles (5.7 km) west of Portal along the road to Paradise, Cochise County, Arizona; 31°57.0′N, 109°10.5′W; elevation ca. 1590 m. It is a comparatively hot, south-facing slope in the Upper Sonoran Life-zone with vegetation consisting of scattered bushes, agaves, and cacti. Dominant plant species at the site include *Juniperus monosperma, Dasylerion wheeleri, Agave palmeri, Fouquieria splendens, Acacia greggi, Acacia constricta, Opuntia thaecantha, Rhus microphylla,* and *R. choriophylla*. The hillside is characterized by a fairly extensive limestone outcropping. Specimens were found estivating under rocks.

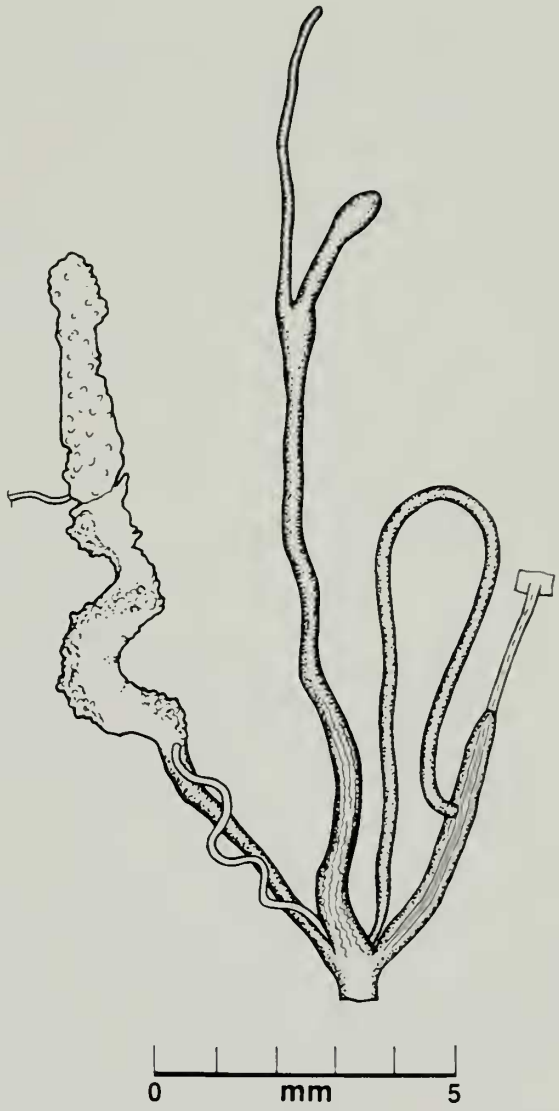

Figure 4

Reproductive anatomy of *Holospira c. chiricahuana*. Specimen collected in Cave Creek Canyon, Cochise Co., Arizona (type locality), 15 April 1987. L. H. Gilbertson slide No. 8.

Etymology: This species is named for Wade C. Sherbrooke, a long-time friend and resident director of the Southwestern Research Station of The American Museum of Natural History located in the Chiricahua Mountains. He was very helpful in the discovery of the new species.

Disposition of types: Holotype: Santa Barbara Museum of Natural History No. 35043. Paratypes: Academy of Natural Sciences of Philadelphia No. 371717; National Museum of Natural History No. 860424; University of Texas at El Paso No. 11107; Field Museum of Natural History No. 208713; Florida Museum of Natural History No. 122794, Los Angeles County Museum of Natural History No. 2209, L. H. Gilbertson No. 66.

Discussion: The subgenus *Holospira s.s.* is defined by the presence of four lamellae within the penultimate whorl of the shell. Based on limited fossil evidence, it is hypothesized that the possession of all four lamellae was the primitive, ancestral *Holospira* condition and that, subsequently, many species have lost some or all of these lamellae (PILSBRY, 1953:140). Accordingly, *H. **sherbrookei*** is thought to retain the primitive lamellar condition and all other known species from Arizona, New Mexico, and northwestern Texas have become reduced and quite variable in this respect.

The shell of *Holospira **sherbrookei*** most resembles that of *H. arizonensis*. However, the shells of *H. a. arizonensis,* and the similar *H. a. emigrans* Pilsbry & Ferriss, 1910, are slightly wider and more cylindric, with a conic apex. Internally, the lamellae are fewer (usually one or two), more variable, and reduced in size compared to those of *H. **sherbrookei*** (Figure 1D).

The reproductive anatomy of *Holospira **sherbrookei*** is generally similar to those of *H. arizonensis* (Figure 3) and *H. chiricahuana* (Figure 4). However, the male genitalia of *H. arizonensis* are smaller, and its spermathecal diverticulum is more slender and substantially longer than that of *H. **sherbrookei***. By comparison, the reproductive tract of *H. chiricahuana* is smaller overall; however, the male genitalia are comparable to those of *H. **sherbrookei***.

In contrast, the reproductive anatomy of *Holospira **sherbrookei*** is quite unlike that of the two other members of the subgenus *Holospira s.s.* for which the anatomy is known. One, *H. goldfussi* (Menke, 1847), from south-central Texas (the only other United States species in this subgenus) lacks a spermathecal diverticulum and exhibits a "capacious" vagina (PILSBRY, 1903:pl. 19, fig. 52). The other species, *H. milleri* Gilbertson, 1989, from adjacent Sonora, Mexico, also lacks a spermathecal diverticulum and contains a verge in its penial complex. It also lacks the long, tubular epiphallus characteristic of *H. **sherbrookei*** (see GILBERTSON, 1989). Hence, based on its reproductive anatomy, *H. **sherbrookei*** appears to be very closely related to species in the subgenus *Eudistemma,* and only distantly to other members of *Holospira s.s.*

The foregoing represents anatomical evidence that *Holospira s.s.* is not a valid phylogenetic group, but rather a "form-subgenus" composed of numerous, diverse species that exhibit quadrilamellate shells. It appears that this subgenus will need revision at some point using characters more dependable than the number of internal lamellae (see PILSBRY, 1953:141).

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LITERATURE CITED

BEQUAERT, J. C. & W. B. MILLER. 1973. The molluscs of the arid southwest with an Arizona check list. University of Arizona Press: Tucson, Arizona. i–xvi + 271 pp.

GILBERTSON, L. H. 1989. A new species of *Holospira* (Gastropoda: Pulmonata) from Sonora, with the reproductive anatomy of *Holospira minima.* Veliger 32(1):91–94.

PILSBRY, H. A. 1903. Manual of conchology. (2)15, Urocoptidae. Philadelphia. i–viii + 323 pp.

PILSBRY, H. A. 1946. Land Mollusca of North America. Monogr. Acad. Natur. Sci. Philadelphia 3, 2(1):i–vi + 520 pp.

PILSBRY, H. A. 1953. Inland Mollusca of northern Mexico. II. Urocoptidae, Pupillidae, Strobilopsidae, Valloniidae and Cionellidae. Proc. Acad. Natur. Sci. Philadelphia 105:133–167.

THOMPSON, F. G. 1976. The genus *Epirobia* in Chiapas, Mexico. Nautilus 90(1):41–46.